

Nanostructured Tungsten Rhenium Components for Propulsion Systems, Phase I

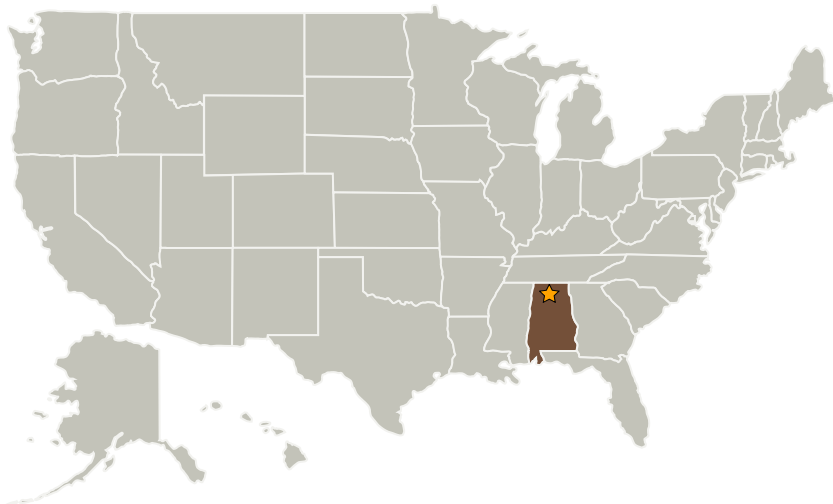
Completed Technology Project (2005 - 2006)



Project Introduction

Revolutionizing the space propulsion industry through innovative, relatively low-cost, manufacturing techniques is extremely needed. Specifically, advancements are needed for components in new high-powered electrical, beamed energy, and nuclear propulsion systems. Innovative processes for fabricating large, net shape, nanostructured tungsten-rhenium components are proposed. Innovative liquid precursors, tungstic acid and perrhenic acid, will be used in conjunction with powders. Vacuum Plasma Spray parameters will be developed to deposit nanostructured W-Re material. The techniques will then be used to fabricate samples for microstructural characterization and tensile testing. After optimization, non-eroding throats will be fabricated and hot fire tested at ATK/Thiokol at no cost to the Phase I effort. Tungsten is being used for its high melting temperature and chemical stability, and rhenium is used to improve ductility. The ability to fabricate nanostructured tungsten-rhenium components to net shape will revolutionize the ultra high temperature materials industry.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Marshall Space Flight Center (MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Plasma Processes, LLC	Supporting Organization	Industry Veteran-Owned Small Business (VOSB)	Huntsville, Alabama

Primary U.S. Work Locations

Alabama

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.6 Materials for Electrical Power Generation, Energy Storage, Power Distribution and Electrical Machines